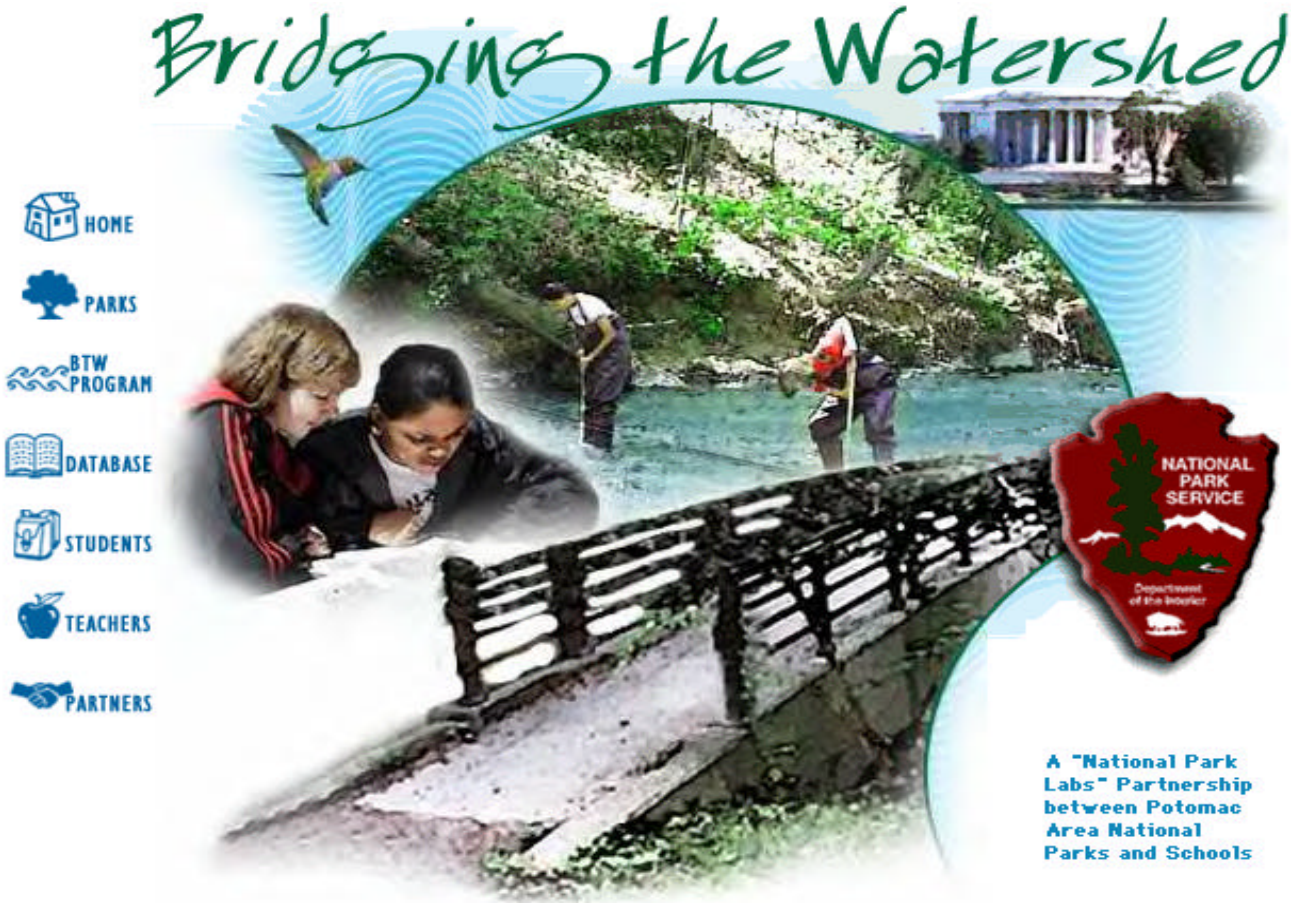
Final Report to the Consortium for Education
U. S. Department of Education
September 22, 2000

Online Learning Module



http://www.bridgingthewatershed.org

The *Bridging the Watershed* program was created by grants from the National Park Foundation and Toyota USA Foundation, National Park Service, U. S. Department of Education, Meyer, and Cafritz Foundations with in-kind services from the Alice Ferguson Foundation, National Park Service, and Prince George's County Public Schools.

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Executive Summary

Bridging the Watershed (BTW) is a National Park Labs partnership between national parks and schools in the Washington, DC metropolitan area. BTW offers high school students opportunities to study real-world science in the national parks. The program incorporates current resource issues impacting the Potomac watershed and promotes national parks as learning laboratories. The BTW program provides a model that can be replicated in other watersheds.

Five multidisciplinary curriculum modules have been developed for Earth science, chemistry, environmental science, and biology students. These modules focus on watershed chemistry, ecology, geology, and cultural impact on the watershed over a 400-year period.

The BTW web site provides online activities that better prepare students for on-site lessons in the parks, enrich existing curricula, and reinforce the educational experience. An interactive database on the web site allows students to upload authentic data collected in the parks that will serve as an important online resource of watershed data and provide a vehicle that allows all partners to share watershed education with the greater community.

The BTW web site team consisted of: 1) a team leader who coordinated the development and implementation of the web site, 2) educators from the Washington, DC metropolitan area who created the online activities, and 3) a web designer who created the site and programming for the online activities and database.

Funding for the first year of the BTW online module was made possible through a generous grant from the U.S. Department of Education and the Government Information Technology Services Board (GITSB) Innovation Fun, administered by the General Administration. The Alice Ferguson Foundation, National Park Service, and Prince George's County Public Schools donated many in-kind services.

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The Process

The DOE grant was awarded in May 1999 just as the *Bridging the Watershed* program completed the halfway mark in the three-year National Park Labs project funded by the Toyota USA Foundation. The watershed curriculum had been written and was in the process of being revised. Two teacher/ranger summer training institutes were held and students began onsite field studies in the parks. The next step was to create a web site to support the program and generate an interest in an educational community beyond our partnership.

A kick-off meeting was held at Hard Bargain Farm in Accokeek, MD on September 18, 1999. Nine educators and support personnel gathered to create the framework for our web site and assign tasks to individual team members. All team members lived in the Washington, DC metropolitan area which proved to be an asset; it is always advantageous to have a short commute and face-to-face meetings when needed. Seven members of the original working group remained committed to the project throughout the grant period. Development of online activities was a quantum leap for most team members, but we felt that our online audience would best be served if teachers, participating in the BTW program, created the online activities.

It was decided that the existing curriculum could be strengthened with online, interactive activities. Some activities could better prepare students for field studies in the parks, while other activities could be an extension of the curriculum. Teachers indicated that students needed to have more experience with macroinvertebrate and plant identification before going to the park. Two educators agreed to create these interactive activities. A third educator stated that he had created a board game about anadromous fish and perils encountered as they swam to the ocean and back to their spawning grounds. He believed it could be an interactive online game that would help students to understand cultural and natural impacts on spawning fish and agreed to take on the challenge. At the end of the kick-off meeting each team member had an assignment and, to save time, it was agreed that future meetings would only include individuals working on a selected activity.

The crucial pieces and lynchpin of development, involved securing a host, obtaining technology support, and maintenance for our web site. Initially we started the BTW web site using space on the Prince George's County School system's server. It was proposed that *the Information and Telecommunications Division* of the National Park Service at the Main Interior Department Building would be the permanent host. Rock Creek Park would provide the technical staff support needed to develop, implement, and maintain the web site. The only projected hosting fee was a onetime purchase of a SCSI drive. The BTW server would be connected to a T-l line, which allows 1.5 MB of data to be transferred per second.

This search for a permanent home lasted from July through January 2000. We soon realized that the cost of the SCSI drive was grossly underestimated and funds weren't available to purchase the needed hardware. The National Park Service staff, ranging from superintendents to rangers, in the National Capital Region attempted to find a way to provide space for our web site on existing servers. This undertaking, at times frustrating, ended in disappointment. The existing infrastructure could accommodate our online activities and additional staff could be dedicated to the project to create the computer programming for the online interactive activities. At the end of January 2000 we were granted permission by the Department of Education to find another partner in the BTW partnership who would be willing and able to accommodate our needs.

Server issues delayed the development of the interactive database and interactive activities. It would be too costly for a web designer to create a program and then change it because the software wasn't compatible with the permanent host server. In February 2000 we hired a very talented web developer to design our web site.

All activities were created were created by April 2000. Activities were 1) reviewed by team members, 2) feedback was given to the team leader, 3) revisions were made, 4) an educator edited the material, and 5) then activities were given to the web developer for programming. Educators used students in their classes to do informal pilot testing of an interactive activity. The interactive activities (macroinvertebrate identification, plant key, go fish game, and database) and most other sections were completed and online by the end of May 2000.

Coordination and planning occurred in meetings, phone conferences, and email messages. We were fortunate that all team members used email consistently and it proved to be a reliable means of communication, especially with classroom teachers.

Our first opportunity for teachers to review the site was during our third annual summer teacher/ranger institute held at the end of June 2000. During July the glossary, that compliments the BTW curriculum, and timeline showing changes and events over a 400-year period were completed and included on the web site.

Description of Module

Bridging the Watershed (BTW) is a new multifaceted educational partnership in the Potomac River watershed that began in March 1998. The partnership consists of six national parks in the District of Columbia metropolitan area, two school systems, several nonprofit organizations and one university.

This partnership developed an education program that weaves school curriculum and national park themes together in a format that enhances student learning, fosters stewardship, offers meaningful service learning experiences, and allows parks to efficiently share educational resources with high school teachers and students. The targeted BTW audience are students (high school 9-12), teachers, parks, and nonprofit environmental organizations. Others who wish to replicate the project or log on to the web site for information or classroom activities will be the extended audience.

The BTW partnership recognized that technology would enhance the program and achieve the following goals:

- Improve collaboration among partnership and facilitate an active watershed network.
- Enrich and reinforce the educational experience of program participants.
- Serve as resource of watershed data.
- Heighten awareness about the BTW program, and share the partnership program as a model that can be adopted in all watersheds.

Interactive Online Activity – Plant Identification Decision Tree

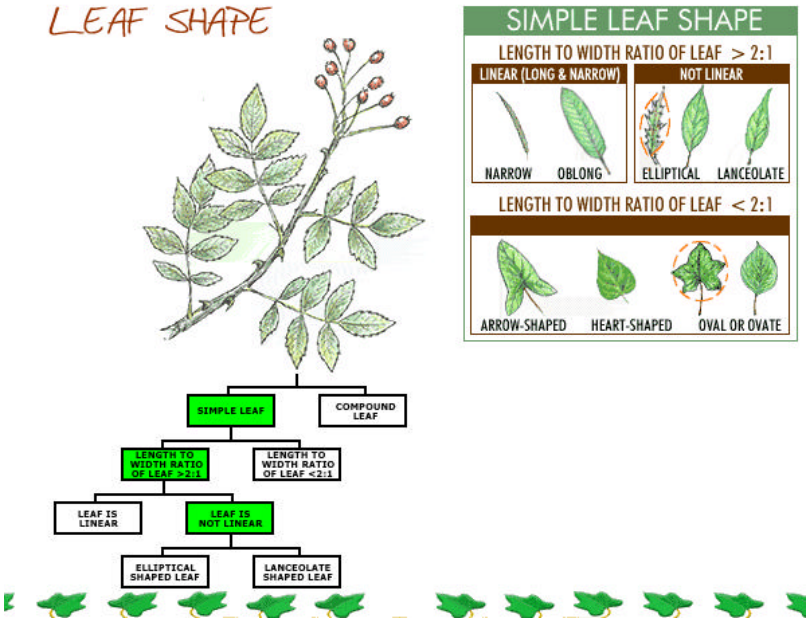
Woodland Edge

Meadow

Lowland Forest

This online activity is included in the curriculum module, “Alien Invaders” as a pre-field study classroom activity. In this interactive online activity students become familiar with a distinct ecosystem (i.e. woodland edge, meadow, lowland forest) similar to one they will investigate in a nearby park and use a decision tree to learn plant identification.

The following graphic is a sample page of the activity that illustrates a plant found in a woodland edge. Students attempt to identify the leaf shape from information provided and clicking on the choices in a decision tree. When successfully completed they move to two other screens to determine leaf margin and leaf arrangement and then learn the name of the plant.



Feedback from field-testing curriculum in the parks indicated that students were not versed enough in plant identification and much precious field study time was lost learning how to identify plants being studied. Learning to identify plants is difficult and high school textbooks generally don’t provide such information/activities. Studying the more global issue

of exotic plants and the threat to native species remained a worthy issue for students to explore and the need to better prepare students created a concern. Teachers said an online interactive activity, that provides students with basic plant identification techniques, would be helpful. Teachers also said that this activity would better prepare students for field experiences as well as learning plant identification in any biology class. Initial feedback about potential for use of this activity in a classroom setting has been extremely positive.

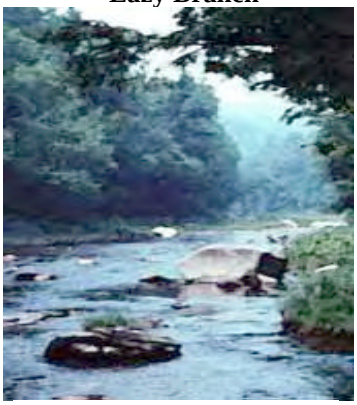
Interactive Online Activity – Macroinvertebrate Identification

In the BTW curriculum module, "Water Canaries", students observe a stream habitat and collect data about the macroinvertebrate communities living there. After returning to the classroom, they assess the health of the stream by comparing types and numbers of macroinvertebrates present.

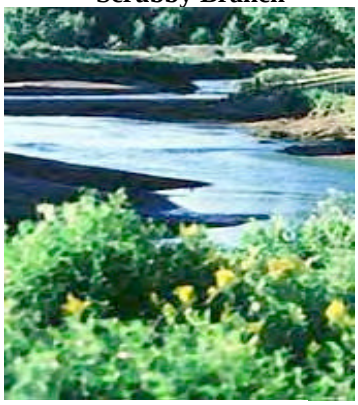
Feedback from field-testing curriculum in the parks indicated that students were not versed enough in macroinvertebrate identification and much precious time was lost in the field learning how to identify the creatures being studied.

In the online activity students use basic characteristics to identify macroinvertebrates found in two streams. When correctly identified each macroinvertebrate is replaced with a point value. The point value indicates the sensitivity to pollution (i.e. the greater the sensitivity, the higher the point value) and students can use the point value to determine which stream is healthier.

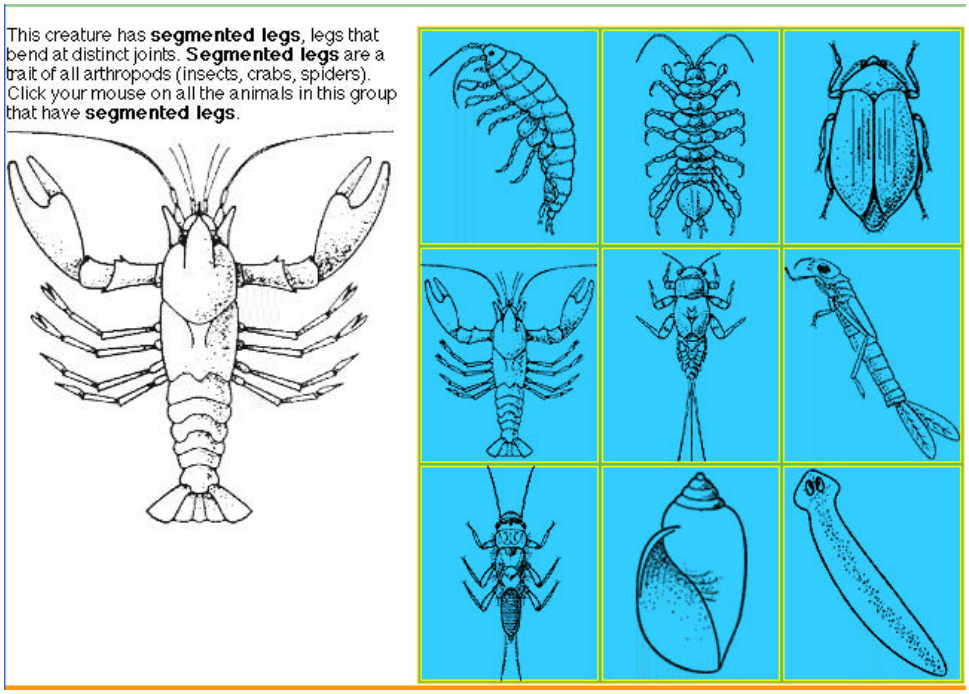
Lazy Branch



Scrubby Branch



In the following sample page students learn to identify a crayfish by reading about segmented legs and examining drawings of creatures with and without segmented legs. They eliminate creatures that don't have that specific body-part then move to another page to study another body-part. Eventually only one creature is left and the creature's name is revealed.



The macroinvertebrate activity is appropriate for any biology class studying macroinvertebrates and is applicable to an audience beyond the BTW partnership.

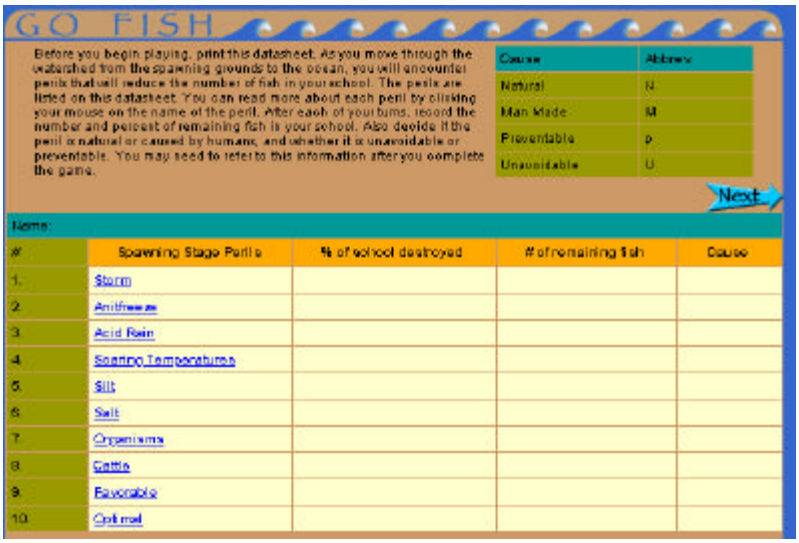
Interactive Online Activity – GO FISH: The Incredible Journey of the Anadromous Fish

Anadromous fish are species of fish that migrate each year to a spawning area. Each spring they leave the open ocean and travel into estuaries, coastal and freshwater rivers, and creeks to release their eggs. As the season moves into late summer and early fall, the juvenile fish leave the shelter of the upper estuary and begin a journey to the open ocean from which their parents came. During this trek the fish encounter many perils and not all of them will survive to reproductive maturity.

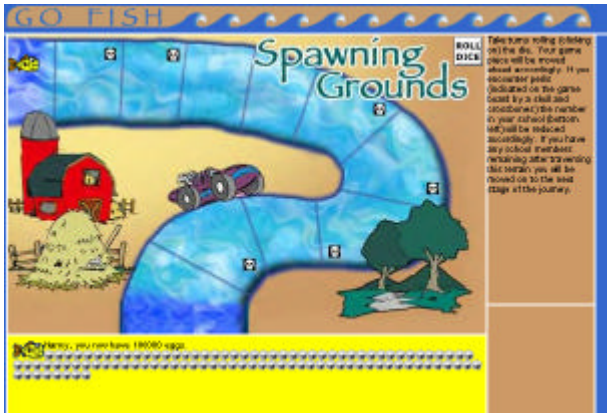
Go Fish is an interactive game intended to educate kids about larger watershed issues. The engaging graphics and game format are appealing to students in middle and high school, in and outside the partnership. It is not directly tied to any of the five BTW curriculum modules, but is a theme addressed in the watershed program.

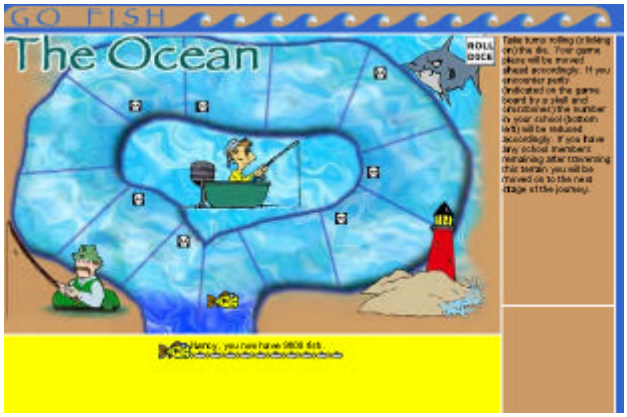
The game can be played with one or two players. It can be a fun activity or used in an educational setting; both enhance understanding about a watershed and the life contained in it.

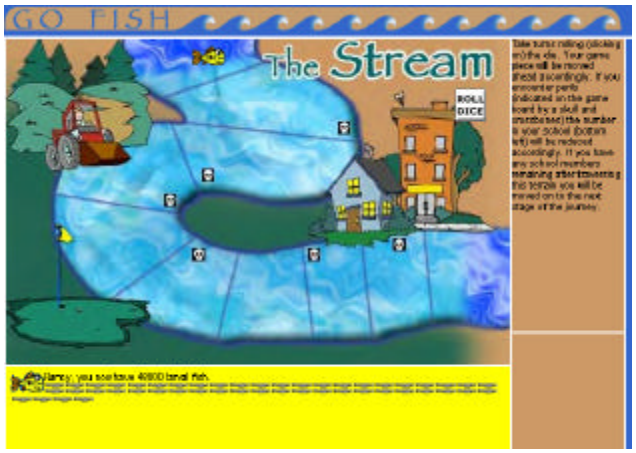
A data sheet (shown in graphic to the right) is available to record perils the fish encounter, the cause of the peril, % of school destroyed, and number of remaining fish.

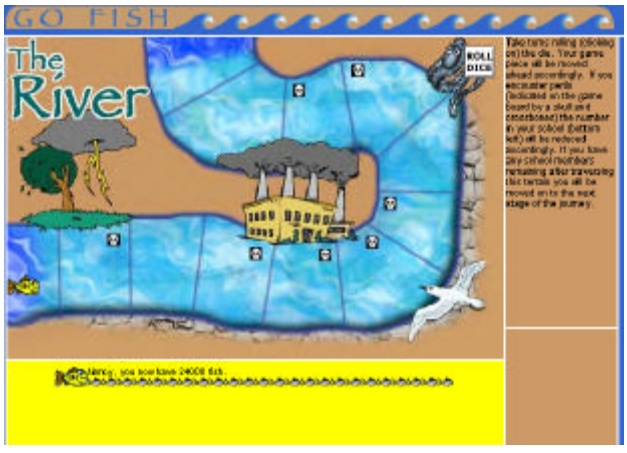


There are four waterway segments (spawning grounds, stream, river, and ocean) that fish need to survive in order to complete the trek back to the spawning grounds and have an opportunity to continue the life cycle.





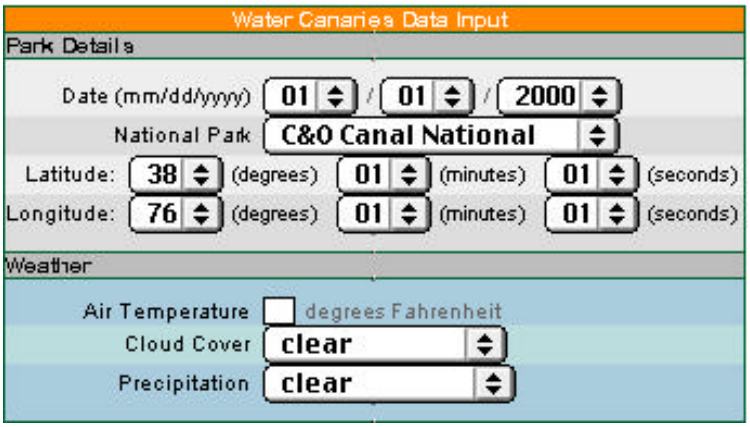




Interactive Online Activity – Database: Authentic Data Collected in the Park

An important function of the BTW web site is the interactive database that allows students to enter, retrieve and display data collected during field studies in the parks. All classes that participate in the BTW program are given an account password to access the database and upload data collected after completing a specific curriculum module in the park.

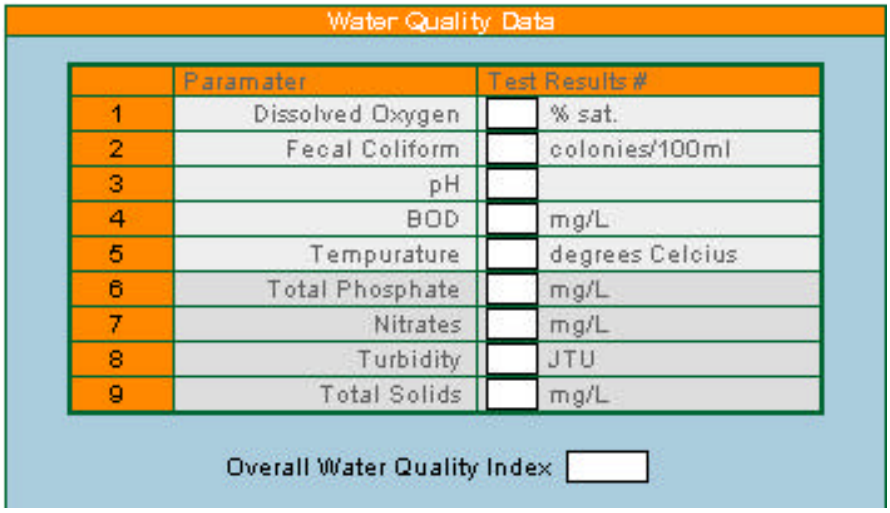
All data (e.g. water quality, macroinvertebrate populations, alien invasive plant species, runoff and sedimentation, and trash found in the watershed) collected remains a part of the database and over time it provides a substantial amount of information. New data can be compared to data collected by students in other classes or schools during the same school year or review trends over time. National park resource managers can also review this data.



Although students from other watersheds cannot load data they will be able to view and display collected data.

Standard data pertaining to date, park, latitude, longitude and weather conditions are always recorded. Students may want to analyze changes over time at the same location as well as the entire watershed and, of course, weather can impact findings.

The following data table provides an example of the kind of data students who are exploring the curriculum module, "Watershed Watchdogs: Assessing Water Quality", will enter. In this module nine parameters are recorded and a water quality index (WQI) is computed that gives an overall indication of the water quality.



Interactive Online Activity – Historical Timeline

This online activity provides students, teachers and other interested persons information about the history of the Potomac River and surrounding areas from 1560 through 2000. The history, cultural changes, notable changes in the river and other interesting tidbits that are listed fulfill a necessary component of the BTW program. This multidisciplinary activity shows changes over the last 400 years that have impacted the Potomac watershed. Students can research significant historical happenings and correlate these to changes in the water quality, sedimentation, or other issues studied in the curriculum.

Also included in the timeline are other related historical events to help the student gain a better perspective of the time span in which local events occurred. Students in social studies classes, as well as science, can use this timeline.

Interactivity Online Activity – Glossary

This glossary was created from the content used in the curriculum documents. Students can use this glossary or refer to the other watershed links page for other web sites that contain a watershed glossary.

Other Web Site Sections

The web site provides a vehicle for collaboration between partners. Educators and students can explore the **Parks'** section to learn more about the history, resources and other general information about parks in the partnership that will be used as field study sites. Teachers interested in becoming involved with the BTW program can explore the **Teachers'** section to learn more about the program, curriculum, summer teacher/ranger institute and student service project opportunities.

The existing BTW partnership is composed of six national parks, two school systems, one university and several nonprofit environmental organizations. While the most interested parties would be those in the partnership, educators, students and others interested in watershed education would find our web site informative and useful. The web site, also, enables us to promote and expand efforts to include other parks and schools in the Potomac watershed.

Pilot Testing

Due to delays that were beyond our control, such as server issues, we have not been able to complete formal pilot testing in classrooms as we had hoped. The information we have gathered thus far has come from participating BTW teachers who were asked to explore the web site and complete a questionnaire and one classroom observation by the team leader.

Formal pilot testing will occur during the 2000 –2001 school year. A combination of classroom observations and student/teacher questionnaires will help provide the information for revisions in the next phase of development.

Classroom Observation: September 19, 2000, 9:30 – 10:30 AM

The observation was conducted in a high school medial center with 20 computers that were networked, but not hooked up to a T-1 line. Before the 19 environmental science students (grades 10, 11, 12) arrived, the media specialist frantically tried to boot up all computers. She stated that someone tampered with the main computer and her password wasn't effective. Problems were overcome and enough computers were up and running when students arrived; the teacher assigned two students to a computer. (Note: There are two other computer labs in the school, but neither was open.)

In preparation the teacher was asked to create a lesson to prepare students for the field study, "Water Canaries." The teacher visited the web site prior to class and wrote a study guide. Copies of the guide were not available until 30 minutes after the class started. The guide, an introduction to the BTW program, consisted of 13 steps with directions and questions. The lesson was very teacher-directed and all students worked though each question together. This created much "lost time" with some students sitting at the computer looking at the same screen while they waited for others to complete questions.

Students were able to easily access static pages, but problems occurred when they tried to play the "Go Fish" game. Play could not advance beyond approximately five moves on the game board. This problem occurred because computers weren't hooked up to a high-speed line.

Recommendations:

1. Although more teachers (and students) are computer literate and use the Internet for information and lesson preparation, incorporating online modules into classroom lessons is a weakness. Teacher workshops would be extremely helpful to model performance-based Internet and BTW web site lessons.

2. Computers need to be hooked up to high-speed access lines.

Teacher Questionnaires

Eleven teachers were asked to review the web site and complete a questionnaire. To date only five of the 11 people have responded. The following table reflects overall comments regarding the web site.

Overall Comments

Please place a check in the column that best expresses your opinion for each of the following items

Description	Strongly Disagree	Disagree	Agree	Strongly Agree
1. It is appropriate for high school students .			2	3
2. It contains accurate and credible science information.				5
3. It provides opportunities for individual and/or collaborative work for students			2	3
4. It is user-friendly.			4	1
5. The visuals are attractive/appealing.			2	3
6. The colors and fonts are easy to read.			3	2
7. Wait-time, when loading pages, is acceptable.	2		2	1
8. Some sections are appropriate for students who are not involved in the program.			4	1
9. It is appropriate for students with different learning abilities.			4 *	1
10. I would recommend this web site to other teachers.			2	3

* One of the four teaches indicated that it was site dependent.

Responses to questions about individual online interactive activities:

"Plant ID Decision Tree" Activity

Strengths:

- Adequate selection of habitats, visually appealing pages, clear directions, photos are excellent, plant labeling after correct choice is made is excellent, reinforcement after correct choice is made is excellent, reinforcement after correct choice is made could be livelier-color, animations.
- Logical and systematic process in elimination and identification of the components necessary to conclude the task.
- Provides a guided practice for keying plants prior to the field experience. If students don't have an opportunity to practice and gain the skills required to conduct the field experience in advance of the trip, they are less confident during the actual experience and are often too rushed to use a key to identify biota with the level of accuracy expected. This activity permits students to attain the elemental observational techniques that are a requisite to good field studies. The activity helps to reinforce concepts surrounding biodiversity that is reflected by the morphologies of the different

plant species keyed during the activity. Morphological differences are in turn a reflection of adaptations to the environment in which the species coevolved.

- Beautiful artwork- MEADOW #1 leaf shape a. line and text appears, b. leaf shape not apparent to student as it comes from root, c. what do you do after click on yellow arrow—no instructions. #2 much better example-should be first for student to try. #3 thistle leaf is described as elliptical, appears from drawing to be linear. #5 OK question again on linear. #6 double click required on many frames. WOODLAND EDGE #1 I got "java error" on frame, crashed, java error on all boxes for this ID #2 English Ivy – grasping rootlets, #3 Maybe a color berries? #4 garlic mustard has pungent smell when crushed. # 5 OK. #6 Tree of heaven described as alternate leaves in key there should be explanation of branch as it is clear the leaves are opposite on branch although alternate on stem. LOWLAND FOREST #1 multiflore rose came up ? in Power Mac. #3 Java error, quit, reload. #4 OK. #5 OK again, needs unique feature. #5 Good about toxins against other plants.
- Good drawings. Easy to follow flowchart. I know very little about plant ID, but could easily follow the sequence.

Is there anything that needs clarification or elaboration in this activity?

- Maybe mention that the activity takes some practice.
- Some difficult with identification of shapes.
- The activity is well constructed and achieves the intended purpose. Students will recognize the identification of species with morphological based keys is a decision making process where attention must be paid to structural details and components. Key could include the scientific name for the species worked with the activity. Students are likely to come upon scientific names in most keys they use in the field. While it may suffice to recognize and identify a plant by a common name, such common names can be different in different regions. Regardless of the region or common name, the scientific name is a standard that will always apply. Students should be aware of this and know that this is an important element of keying and identification.
- Why identify plant type at heading? Plant is herbaceous but characteristics never mentioned again determine branch as entire "leaf"-confusing for students' add oneor two unique feature about plant-i.e. garlic mustard smell when crushed—too many end up sounding very much alike—Where does it go? Screen-fit too large for monitor. Constant schrolling when ID is complete "congratulation box" should click you back to fact sheet, annoying to have to click yellow arrow again. How do you get out in the middle of activity? Can anything be saved?
- Starting page implies that each park has only one type of forested area. Is there a way to clarify that point? You don't want to create misconceptions. Is there somewhere to link a picture of the total flowchart? I would like to have been able to see the whole identification scheme at once.

Errors—scientific or editorial:

- I didn't notice any scientific or editorial errors.
- None
- None detected
- None that I could identify.

"Macroinvertebrate ID" Activity

Strengths:

- Clear directions, easy to navigate, informative, visually appealing, provided immediate feedback, choice of animals is good.
- Great activity. The links were excellent comparison and logical development in the identification.
- Like the plant key activity this provided students with a guided practice to attain the skills required to identify aquatic organisms in the field. Students can do their field study identification with speed, confidence and a higher degree of accuracy because they are familiar with a process that could be time consuming and frustrating without prior practice.
- Quick, Good illustrations, fact sheets more comprehensive, use of leeches for example, nice finish.
- Clear drawings. Easy to follow sequence. All levels could do it.

Is there anything that needs clarification or elaboration in this activity?

- The directions are straightforward and clear.
- None
- I think the lesson is well constructed and thought out. As stated in the previous activity, scientific nomenclature should be included with the common name for each organism described.
- Gills hard to see on drawings it is discovered by guessing. How do you get out of it?
- a) Can you put in a picture which gives you an idea of relative scale? They all look the same size and they are all huge. b) You can identify them but simple inspection, without going through the classification system. Can you alter the picture of the unknown macro to force the students to follow the sequence. c) Add an escape button at the bottom during the classification sequence. You can get trapped. d) Is there somewhere to link to a picture of the total flowchart? I would like to have been able to see the whole identification scheme at once.

Errors—scientific or editorial:

- I didn't notice any editorial or scientific errors
- None
- None detected or that I am aware of at this time.
- Shrimp is shown as having six legs in one section, more that 6 in another.
- None that I could identify.

"GO FISH: The Incredible Journey of the Anadromous Fish" Game

Strengths:

- Background information is excellent, page is virtually appealing, directions are clear. I really liked having the dice roll on the screen. Involves math on a small scale, but it demonstrates integration of subjects.
- The emphasis of survival and ultimately en….ment that can diminish the population.

- The game is engaging and teaches about not only the biology of a fish species but also about the bigger picture behind poor stewardship of natural resources. They can also see the benefits of wise stewardship and management of natural resources. Students are provided with the life cycle of a less known but important fish species that in spite of the carelessness and degradation of their watershed at the hands of humans manage to survive and continue the species. Students can better understand how everyday decisions on both a personal level or through the collective process of government can have a positive or negative impact on an ecosystem and the species within.
- Word background sheets are good—you pick what you need. Love the last page at fish heaven and spawning fish. Good animation.
- Clear drawings. Easy to follow sequence. All levels could do it. Good detail about all aspects of the problem.

Is there anything that needs clarification or elaboration in this activity?

- I don't see a need for elaboration on this activity.
- Perhaps causes for the demise of the population at various sites.
- Maybe some links to a picture archive in the Read More About it section of the game. Pictures and photos to better illustrate some of the equipment and devices used to harvest the fish or photos to help illustrate some of the perils encountered by the fish.
- Too much information up front-need to make it optional. Font difficult to read.
- a) Very wordy beginning. Possibly use the About the Game as your first page with a link to details. This may turn kids off. b) Some vocabulary which is used (as brine) may need to be clarified or added the glossary. c) Not all schools have print capability on their Internet connections. And if you do print, it is three pages. Is their a way (yes, it compromises detail) to shorten it or have an electronic tracking system. d) Is there somewhere to link to a picture of the trip, including losses along the way? This connects back to c. e) On some pages the escape button was hidden and their was no scroll button. f) Zero fish lets you keep going. Is this what you want? It has good and bad to it.

Errors—scientific or editorial:

- None
- None detected
- None
- None that I could identify

Glossary

Strengths:

- Short and easy to understand definitions
- Pretty layout—concise definitions—readability level high
- Provides students with a quick reference to terms they may not be familiar with. Serves the purpose of providing definitions for most of the terminology critical to the student activities section.
- Simplistic but informative for everyone

Is there anything that needs clarification or elaboration in this activity?

- a) Terms which you might add include anaerobic (you have aerobic), controls (you have variables) and brine (from fish journey). b) suspended sediment: Don't use suspension in the definition unless you define it.
- Long load time- 2+ minutes Then computer froze, reopen, repeat. Had to open on school computer. Could the choice bar for letters be located at the end of each letter section? Continued scrolling back to the top is tedious.
- Probably not comprehensive enough. It would hard to have a "complete" glossary on a topic as broad as this given the limitation of Internet based files, however, many additional terms could be added.
- None

Errors—scientific or editorial:

- a) Wetlands are not always wet. Wetlands are "areas that periodically have waterlogged soils or are covered with a shallow layer of water resulting in reduced soil conditions." From the Water Environment Federation. b) Velocity is a vector, it has magnitude and direction. Speed is a scalar, it has magnitude. Stream velocity is the speed and direction of water flow. c) Oxidation is when an atom becomes more positively charged Reactions with oxygen are the most common form of oxidation, but there are many others. They occur as part of oxidation-reduction reactions. d) Orthophosphate refers to an organic phosphate where the phosphate is attached on the ortho position in a benzene ring. Organic phosphate can be in an ortho or meta form. e) Nitrate is one form of nitrogen used by plants. Some plants take in nitrogen directly from the atmosphere and are nitrogen fixing.
- None detected
- None

Timeline

Strengths:

- Excellent linkage of historical and environmental data. My favorite section.
- Very comprehensive and interesting for 1500 and 1600—suggested uses?
- A time reference is an important tool to give students perspective on how the use and focus on the river has changed. More importantly the timeline indicates changes in technology, commerce, government, populations, development, etc., all of which have had an impact on the river. In some instances a single even in time has had a dramatic impact on the river. The construction of a dam, power plant, wastewater treatment plant, bridge or a new community. Such events often precede issues that later come up along the river I am glad to see an effort to include this as a component of the web site in general.
- Concise and informative

Is there anything that needs clarification or elaboration in this activity?

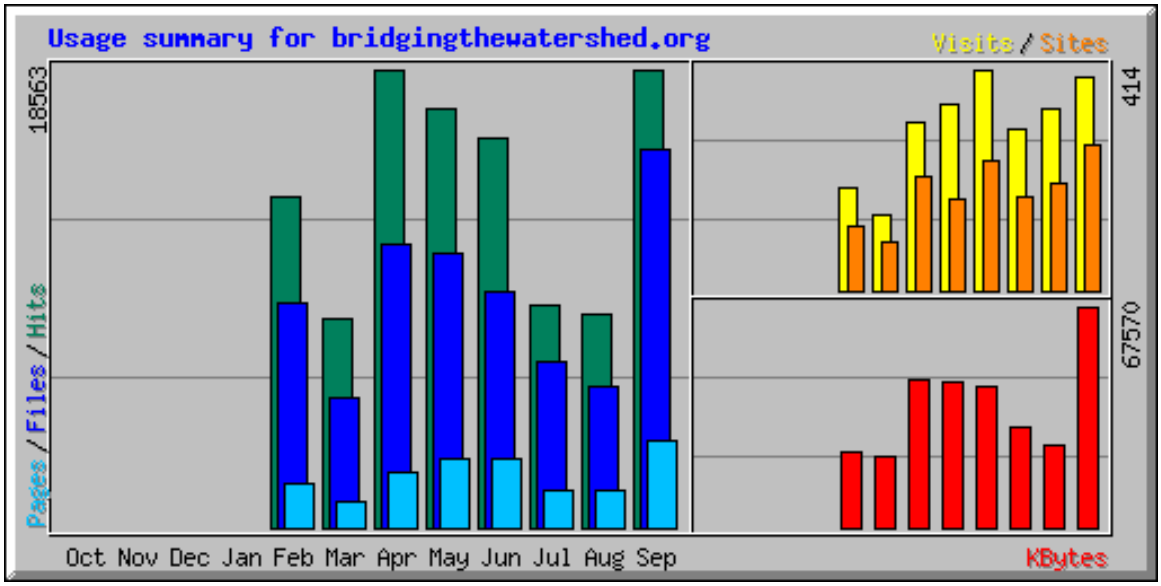
- Too much detail for casual browsing by students, but its their loss. Excellent for directed lessons. Not complete, no 1600 and missing graphics from 1800 and 1900.
- Froze machine loading 1900-tried on Power Mac at school-long load time 1.5 mins but came up—good looking site, lots of tidbits.
- Too Eurocentric in the beginning. Why not begin with the transition of prehistoric cultures in the region. Paleo, Archaic, and Woodland Indian cultures all lived within the Potomac watershed and each had their own impact in how they used natural resources. Why not take the timeline farther back and examine the origin of the watershed and some of the physical and geologic changes that have occurred up to the influences of humans. I really don't see the need to have "other" world historic events to the right of the Potomac watershed events. The events in Potomac watershed are significant enough that they can stand-alone. Instead of the world historic events add more pictures wherever possible to the Potomac watershed events.
- None

Errors—scientific or editorial:

- None
- None that I saw
- HTML language in 1600-1699. Frame 1608 HTML language at 1922, 1928, 1932, 1934, 1943, 1982, 1984

BTW Web Statistics

Statistics about hits to our web site can be found at <http://www.bridgingthewatershed.org/webstats/>. Daily and monthly averages help us track usage and plan for future revisions.



Summary by Month

Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Sep 2000	742	613	140	15	272	67570	398	3509	15349	18563
Aug 2000	277	183	48	10	200	25066	339	1492	5693	8613
Jul 2000	292	215	47	9	177	30618	301	1470	6691	9052
Jun 2000	524	319	93	13	244	43386	414	2806	9580	15746
May 2000	547	359	91	11	172	44374	350	2834	11149	16957
Apr 2000	615	381	73	10	213	45068	314	2208	11434	18472
Mar 2000	272	170	33	4	92	21405	143	1039	5296	8442
Feb 2000	460	313	61	6	122	23097	191	1794	9098	13354
Totals						**300584**	**2450**	**17152**	**74290**	**109199**

Lessons Learned

- *Electronic Bulletin Board:* Prior to being awarded this DOE grant, BTW established an electronic board. It was decided that BTW administrators, park rangers and teachers could benefit from an online bulletin board. An electronic bulletin was set up that would allow all partners to ask questions pertaining to any part of the program, receive responses from one or many individuals, read all messages and; therefore, maintain up-to-date information. After a number of prompts to use this online communication format, it was determined that the bulletin board was not effective. We learned that most of the teachers in our program did not regularly check email or have the time to log-on to the Internet frequently. In addition, they thought they were required to write a question or reply.

  We are creating a "email newletter" on our BTW web site. More teachers now have email addresses and, even if they don't check messages daily, the electronic newsletter will be a vehicle to disseminate information and maintain interest.

- *Computer Hardware and Access:* Online modules can compliment classroom instruction, but there are major stumbling blocks with computer hardware and access. One teacher at a local high school noted that $500,000 had been donated to the school for computers and hardware for high-speed lines, but the existing electrical structure in the old building couldn't support the new equipment.

  Teachers often say that access to computer labs is difficult, with other programs (e.g. practice for state exams) taking precedence. Also two computer labs in a school of 2,000 – 3,000 students is not sufficient.

  Stumbling blocks such as those listed above should not stop the development of good online activities, but it is wise to realize existing limitations.

- *Constructivist Theory:* Many teachers do not have an understanding of the constructivist pedagogy and tend to write in a teacher-directed, at times didactic, style.

- *Good Writers:* It was an expectation of the grant that educators be primarily responsible for the content of the online modules. This makes sense since they will be using the interactive activities. Teachers tend to be good instructors, but they don't have the time to write or don't understand the mechanics of writing curriculum. It was difficult putting a good team of educators together who had the skills and time to work with the web site.

  By the time that we were notified that we received the $50,000 award most teachers had already scheduled workshops, jobs, and vacations for the summer. We formed our team after the 1999-2000 school year had already begun; therefore, educators couldn't work fulltime on the project.

- *Web Site Development is Costly:* Programming the online activities we developed required a person with special skills. Staff at the National Park Service was willing to support our efforts, but personnel did not have the time and in some cases the knowledge to do the programming. Teachers don't have this expertise either. Requiring that 70% of the award be used to support contributions from teachers was a bit unrealistic. Good web designer are difficult to find; expecting to find a good one within the partnership who had the time to donate to this project was an impossible task. We were lucky to find a good web programmer designer who grossly under bid the project.

- *A Permanent Home for our Web Site*: Server issues have plagued us from the start. We were given an inaccurate estimate for a server we expected to purchase. Because of the nature of the database we need a server that would cost $10,000 - $12,000; we budgeted only $2,000. Even if money, to purchase the server, had been found, no park in the partnership had the physical space to accommodate the equipment or infrastructure (i.e. high speed lines) to support the database. There was no additional space on an existing server at a partner park or park headquarters.

  The web site is temporarily located at a hosting service. A search continues for a permanent location.

Description of Use of Funds from Grant Money

Description	Amount
Plant ID Decision Tree Development	$8,677
Macroinvertebrate ID Development	$3,585
GO FISH Game Development	$1,470
Glossary Development	$1,140
Timeline Development	$5,206
Parks' Section Development	$675
Watershed Links	$210
Teacher Evaluation	$1,650
Meetings	$990
Web Site Programming & Design	$17,200
Domain Name & Hosting Space	$628
Total	**$41,430**

Description of All In-Kind Activities

Nancy Smaroff, BTW Project Director — $4,500.00
Team Leader: Coordinate and oversee development of online modules and web site

Tracy Bowen, Alice Ferguson Foundation — $1,215.00
Research and search for web host server, team meetings, support team leader

Maggie Zadorozny, Rock Creek Park — $850.00
Search for web host server, meetings

Nick Bartolomeo, Rock Creek Park — $1,430.00

Plans for Next Steps in the Project

For Teachers: Development of online modules will continue. Our next effort will be to focus on the teacher section and include more watershed lesson plans and activities for classroom use. The lessons will be an extension of existing curriculum.

For Students: Create activities incorporating Geographic Information Systems (GIS) maps. These activities would allow students to create maps of study sites that include layering individual characteristics (water, roads, vegetation). With the development of additional curriculum the potential exists for kids to incorporate monitoring of wildlife, vegetation, etc. with GPS meters and displaying these data on GIS maps.

GEM Verification

An online request was submitted to GEM to catalog BTW modules. No verification has been received.